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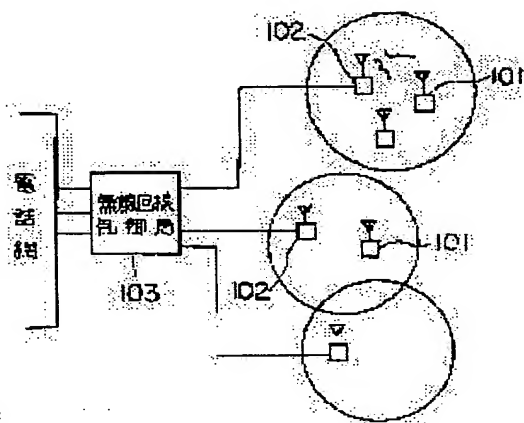
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(54) METHOD OF CONTROLLING CONGESTED RADIO COMMUNICATION

(57)Abstract:

PURPOSE: To make a proper overcrowding control for each mobile station when mobile stations with different communication systems are in the same digital mobile communication system.

CONSTITUTION: In the method for controlling the congested radio communication between a plurality of mobile stations 101 which are connected with base stations 102 through radio lines. The base station 102 detects the number of mobile stations 101 in communication with a plurality of mobile stations and its communication method. Based on the number of mobile stations 101 and the communication method, the traffic amount of the radio line is calculated. The call of multiple terminals is controlled based on the number of mobile stations 101, the communication system, and the traffic amount of the radio line. Thus, it is possible to make the proper control of the overcrowding of multiple mobile terminals with different line utilizing efficiency. It is effective when replacing the system of the mobile terminal from the new one to the conventional one gradually in the same system.



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CLAIMS

[Claim(s)]

[Claim 1] The process which is the approach of the congestion control in the radio between two or more terminals connected with said base station through the base station and the wireless circuit, and detects the number and communication mode of a terminal under communication link among said two or more terminals, The number of the process which computes the amount of traffic of said wireless circuit based on the number and communication mode of a terminal under said detected communication link, and said detected terminals, The approach of the congestion control in the radio possessing the process which carries out a call origination limit to said two or more terminals based on the communication mode and said computed amount of traffic of said terminal.

[Claim 2] Said two or more terminals are the approaches of the congestion control in radio including the terminal which transmits the sound signal encoded with the voice coding rate from which the plurality by time-sharing transmission differs, the terminal which communicates by the communication mode of the half rate by time-sharing transmission, and the terminal which communicates by the communication mode which transmits only an owner sound signal according to claim 1.

[Claim 3] Said call origination limit of said terminal is the approach of the congestion control in the radio according to claim 1 which is controlling accounting to said terminal which carried out call origination.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the congestion control in mobile communications.

[0002]

[Description of the Prior Art] It is in the condition in which the subscriber capacity of the land mobile radiotelephone system of an analog form is saturated, and is. In order to cancel this saturation state, the land mobile radiotelephone of a digital method is adopted in Japan or the U.S.

[0003] Drawing 5 is drawing showing an example of the conventional land mobile radiotelephone structure of a system, and drawing 6 is drawing showing the configuration of the radio channel of the digital method adopted in the U.S. or Japan.

[0004] As shown in drawing 5, a base station 401 and a mobile station 402 communicate by the radio channel. The radio channel is divided into the slot 301 of the fixed section as shown in drawing 4. Moreover, n slots 301 constitute a frame 302. A mobile station 402 samples voice for every time interval of frame length, and transmits the voice data which compressed this sampled voice data into 1 slot length, and compressed it for every n slot. As for a mobile station 402, a channel number and the slot number are assigned through a control channel from a base station 401. Henceforth, it communicates by the channel and slot which were assigned until the hand off happened. Although some frequency use effectiveness is [this method] good compared with the conventional analog form, in order to transmit and receive a signal also in about 60% of silent time amount which exists in voice transmission, frequency use effectiveness is bad. That is, it must be said that the limited frequency resource is used very vainly.

[0005] In order to increase the channel capacity of this conventional TDMA system further, the system which performs owner sound detection of conversation and transmits only the data of an owner sound is examined. What showed the concept is shown in drawing 7. assigning the owner sound part of other terminals at a silent period, as shown in this drawing — it is the system to which the number of coincidence messages per channel is made to increase. Since this system can be used coexisting with the TDMA system which does not carry out owner sound detection, when using it, being intermingled with the conventional TDMA system and changing to this system gradually, it is a desirable system.

[0006] By the way, traffic increases by the digital land mobile radiotelephone system, and if traffic increases beyond a certain value, a system will be in a congestion condition. In order to prevent this, the method with which a base station 401 forbids the new call origination of a mobile station 402 is taken. Furthermore, the number of the methods of transmission and reception of the sound signal of a mobile station 402 and a base station 401 was one in the digital land mobile radiotelephone conventionally. That is, if traffic increases from one threshold decided beforehand, the method which forbids the call origination of a mobile station 402 is taken. Moreover, in order to make the subscriber capacity of a system increase, owner sound detection is performed, and the method which transmits only an owner sound signal is proposed. As for this method, it is possible to make it work by the same system as the conventional

mobile station 402 which carries out TDMA transmission. If a congestion control is performed on the criteria against [of the mobile station 402 of TDMA transmission] call origination in such a conventional congestion-control method, although call origination with the still new mobile station 402 which transmits only an owner sound part is possible, there is a problem which will have call origination restricted. Since call origination is possible for the mobile station of TDMA transmission on the other hand even if traffic is crowded to the extent that new call origination cannot already be performed when a congestion control is performed on the call origination prohibition criteria of a mobile station of transmitting only an owner sound part, call origination of the mobile station of TDMA transmission can be carried out, and the problem from which a digital land mobile radiotelephone system will be in a congestion condition produces it.

[0007]

[Problem(s) to be Solved by the Invention] There is a problem which will have call origination restricted although call origination with the still new mobile station which transmits only an owner sound part is possible when a base station forbids the new call origination of a mobile station, as mentioned above. Since call origination is possible for the mobile station of TDMA transmission even if traffic is crowded to the extent that new call origination cannot already be performed when a congestion control is performed on the call origination prohibition criteria of a mobile station of transmitting only an owner sound part, call origination of the mobile station of TDMA transmission can be carried out. There was a problem from which a digital land mobile radiotelephone system will be in a congestion condition.

[0008] This invention is accomplished that the problem mentioned above should be solved, and it aims at offering the possible system of controlling a communication channel efficiently.

[0009]

[Means for Solving the Problem] In order to attain these purposes, the 1st invention The process which is the approach of the congestion control in the radio between two or more terminals connected with said base station through the base station and the wireless circuit, and detects the number and communication mode of a terminal under communication link among said two or more terminals, The number of the process which computes the amount of traffic of said wireless circuit based on the number and communication mode of a terminal under said detected communication link, and said detected terminals, Are the approach of the congestion control in the radio possessing the process which carries out a call origination limit to said two or more terminals based on the communication mode and said computed amount of traffic of said terminal, and the 2nd invention is set to the 1st invention. The terminal which transmits the sound signal with which said two or more terminals were encoded with two or more different voice coding rates by time-sharing transmission, Are the approach of the congestion control in radio including the terminal which communicates by the communication mode of the half rate by time-sharing transmission, and the terminal which communicates by the communication mode which transmits only an owner sound signal, and the 3rd invention is set to the 1st invention. A call origination limit of said terminal is the approach of the congestion control in the radio which controls accounting of said terminal which carried out call origination.

[0010]

[Function] In controlling the congestion in the radio between two or more terminals connected through the base station and the wireless circuit, the communication mode of the terminal which is communicating among two or more terminals, and a number are detected, and the amount of traffic of a wireless circuit is computed based on this result. And based on the information on the number of the terminals under these communication links, a communication mode, and the amount of traffic, the call origination of two or more of said terminals is restricted.

[0011] For this reason, it becomes possible to control the congestion control of two or more migration terminals with which circuit use effectiveness differs accommodative.

[0012]

[Example] Drawing 1 is drawing showing the basic system configuration of the example of this

invention.

[0013] A mobile station 101 communicates through a base transceiver station 102 and a radio channel. A base transceiver station 102 communicates through the wireless line control station 103 and a wire circuit.

[0014] Drawing 2 is drawing showing the configuration of the radio channel of this example. As for the radio channel, the fixed time interval is divided slot 104, and n slots 104 constitute a frame 105. It is referred to as $n=6$ in this example.

[0015] Three kinds of mobile stations 101 transmit with a base station 102 by such system. One calls it full rate transmission with the mobile station 101 which transmits a sound signal every three slots. One calls it half rate transmission with the mobile station 101 transmitted every six slots. The last one calls only an owner sound part owner sound transmission with the mobile station 101 which transmits voice data. Three kinds of such mobile stations 101 are intermingled by one system, and transmit voice data to a base station 102 by the slot 104. In half rate transmission, transmission twice the capacity of a full rate can obtain per 1 frequency channel. Since owner sound transmission is the method which transmits only the owner sound part of half rate transmission, one twice [about] the capacity of a half rate can obtain it per 1 frequency channel.

[0016] In such a system, the approach of the congestion control of a base station is shown below. According to the traffic of a voice channel, and the class of mobile station 101, a base station 102 determines the criteria which perform a call origination limit.

[0017] Drawing 3 is drawing showing signs that a base station carries out a call origination limit to a mobile station, to change of the traffic of a voice channel.

[0018] If the traffic t of a voice channel increases and the 1st threshold a is surpassed as shown in this drawing, the call origination of the mobile station 101 of full rate transmission will be forbidden. If Traffic t furthermore increases and the 2nd threshold b is surpassed, the call origination of the mobile station 101 of half rate transmission will be forbidden. And if traffic surpasses the 3rd threshold c, the call origination of the mobile station 101 of owner sound transmission will be forbidden. That is, the call origination of all the mobile stations 101 is forbidden. If traffic is becoming low by this, the call origination limit of a mobile station 101 is canceled one by one.

[0019] Next, how a base station 102 determines the traffic of a voice channel is shown. The number with which the mobile station 101 of B and owner sound transmission is talking the number with which the mobile station 101 of A and a half rate is talking the number with which the mobile station 101 of G and a full rate is talking the amount of traffic over the telephone over the telephone is set to C. At this time, it can ask for G with the function of A, B, and C. In the case of 1:2:4, like this example, the circuit capacity per 1 frequency channel can consider as $G=4xA+2xB+C$ by owner sound transmission with a full rate and a half rate.

[0020] Drawing 4 is drawing for explaining the case where make accounting high and a congestion control is made the mobile station 101 which newly carries out call origination, when the traffic of a voice channel has increased in the system of the example mentioned above.

[0021] As shown in this drawing, when Traffic t increases and it goes into the slash section d, a base station 102 tells this thing to the mobile station 101 of the full rate which newly carries out call origination more highly than the usual accounting. If Traffic t surpasses the slash section d, a base station 102 will forbid call origination to the mobile station 101 of a full rate. If Traffic t increases and it is in the slash section e, it will tell that a base station 102 makes higher than usual accounting of the mobile station 101 of a half rate which newly carries out call origination to a mobile station 101. Call origination will be forbidden to the base station 102 of a half rate, if Traffic t increases further and surpasses the slash section e. And if Traffic t goes into the slash section f, it will tell making accounting higher than usual to the mobile station 101 of the owner sound transmission which newly carries out call origination. A base station 102 will forbid the call origination of the mobile station 101 of owner sound transmission, if Traffic t exceeds the slash section f. If Traffic t goes into the slash section when Traffic t decreases, a

base station 102 will tell becoming higher than the usual accounting to the mobile station 101 which releases the mobile station 101 which was carrying out call origination prohibition, and newly carries out call origination.

[0022] Next, how to tell that traffic increased and accounting became high to a mobile station 101 is shown. With voice, one tells that traffic increases and accounting becomes high in call origination at present. A user determines whether to hear this and continue call origination. Another is the approach of displaying the information which tells that accounting becomes high to the display of a mobile station 101. A user looks at the accounting information displayed on the display, and determines whether to continue call origination.

[0023] Furthermore, when performing a congestion control, it is still more effective to determine in consideration of the class and number of a mobile station 101 of adjoining zones. That is, the mobile station 101 which is present in an adjoining zone moves, goes into a self-zone, and has required the hand off plentifully. Therefore, it is important to take into consideration the possibility of the hand off from an adjoining zone beforehand. That is, when possibility of generally carrying out a hand off from an adjoining zone is large, allowances are seen for a while without taking the number of message persons of a self-zone to the max which can talk over the telephone in the zone. When it is the mobile station with which the mobile station 101 which is in an adjoining zone performs owner sound transmission at this time, there are less these allowances and they are good, and many allowances are taken when it is the terminal which the mobile station of an adjoining zone is always transmitting. Thus, the number of subscribers is made [many] and ***** is possible in inferior service called disconnection.

[0024]

[Effect of the Invention] In controlling the congestion in the radio between two or more terminals connected through the base station and the wireless circuit, the communication mode of the terminal which is communicating among two or more terminals, and a number are detected, and the amount of traffic of a wireless circuit is computed based on this result. And since the call origination of two or more of said terminals is restricted based on the information on the number of the terminals under these communication links, a communication mode, and the amount of traffic, it becomes possible to control the congestion control of two or more migration terminals with which circuit use effectiveness differs accommodative. Moreover, within the same system, when transposing the communication mode of a migration terminal to the old terminal from the terminal of a new method gradually, it is effective.

[Translation done.]